On the Fluctuations in the Number of Births, Deaths, and Marriages, and in the Number of Deaths from Special Causes, in the Metropolis, during the last Fifteen Years, from 1840 *to* 1854, *inclusive.* By WILLIAM A. GUY, M.B., *Cantab.; Fellow of the Royal College of Physicians; Professor of Forensic Medicine, King's College; Physician to King's College Hospital; and one of the Honorary Secretaries of the Statistical Society.*

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THE objects which I have in view in the present communication are, 1st, to reduce the facts contained in the "summary of births, deaths, and causes of deaths in London, for the fifteen years, 1840-1854, compiled from the Weekly Returns, and published by authority of the Registrar General," to a form admitting of comparison of one year with another, and useful for purposes of reference; and 2nd, to invite attention to the most remarkable results of such a comparison of year with year, and especially to the fluctuations occurring in the mortality from special causes.

I. For the accomplishment of the first of these objects, the "Summary" to which I have just referred supplies all the necessary materials, inasmuch as it not only tabulates the births, and the deaths from all causes and from special causes*, for each of the fifteen years, but also states the estimated number of the population of the metropolis for each of those years. All, therefore, that remained to be done, in order to reduce these numerical facts to a form admitting of comparison, was to equalize the length of the several years by reducing them to the common standard of 365 days, and to make choice of some convenient number of living persons to which to refer the annual return of births and deaths. For this purpose I have selected the number of one million. The tables in the Appendix are the results of this twofold work of equalization. They display, for the fifteen years 1840 to 1854 inclusive, *the number of births and deaths in a million persons living during a year of* 365 *days.*

II. Before I proceed to make that comparison of year with year, and to notice more especially the fluctuations in the mortality from special causes, which I have stated to be the second object of this communication, I must invite attention to certain circumstances which are known to affect the value both of the individual facts and of the aggregate results.

In reference to the return of births, deaths, and marriages, it will be sufficient to state that while there is reason to believe that the number of marriages and deaths is truly reported, the reported number of births, in consequence of the registration of births not being compulsory, has generally fallen short of the actual number, especially in the first years of the series. This circumstance will have to be borne in mind when I come to speak of the fluctuations in the number of births.

The number of deaths, as I have just stated, is believed to be truly

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* I have been favoured by Dr. Farr with a return of the marriages for thirteen out of the fifteen years, which return is embodied in Table I. of the Appendix.

reported; and it is not till we come to consider the deaths from special causes that we have occasion to feel any misgiving as to the value of the figures contained in the tables. There are several circumstances to be taken into account in estimating the value of the individual facts as well as of the aggregate results. In the first place, it must be borne in mind that, during the whole period of fifteen years over which the returns extend, the attention of the Registrar-General has been steadily directed to the improvement of the registration, by instructions addressed to the registrars themselves, to medical men, and to coroners. As early as 1843 a "Statistical Nosology," very carefully and skilfully prepared, was issued from the central office, with circular letters addressed to the registrars on the one hand and to medical practitioners on the other, the one with the signature of the Registrar-General, the other having the joint signatures of the then Presidents of the Royal College of Physicians and Surgeons, and the Master of the Society of Apothecaries. These circulars, which cannot fail to have had considerable effect upon the registration of the causes of death, were followed in 1845 by Instructions to Coroners, accompanied by a classification of the causes of violent deaths. In this same year, 1845, the Registar-General effected a still more important improvement, by distributing to every qualified medical practitioner throughout the country blank forms of certificates of fatal diseases. Successful efforts were also made to obtain correct returns from hospitals and other charitable institutions.

It will be seen, then, that during these fifteen years, from 1840 to 1854 inclusive, the registrars, the coroners, and the medical profession, were receiving a statistical education at the hands of the Registrar-General; that they were, year by year, becoming more proficient in the work of registration, and that, as a natural consequence, the several columns of the tables, which embody the annual results of this educational training, do not (with exceptions presently to be pointed out,) admit of strict comparison one with another.

It has been just stated that the very important step of issuing to all qualified medical practitioners printed blank forms of certificates of the causes of death was taken in the year 1845, being the sixth year of the series of fifteen years now under review. This year, therefore, constitutes an important era in the history of registration in this country; and the year 1846 may be said to be the first year in which the new forms came into full operation. The last seven years, from 1848 to 1854 inclusive, may, therefore, be conveniently selected out of the whole period of fifteen years, as admitting of comparison of one year with another. The statistical education just alluded to having been completed in 1845, it is reasonable to suppose that before the year 1848 the returns of the causes of death will have attained to all the accuracy of which they are susceptible in the hands of the present race of medical men; and that neither fashion, nor new theories, nor increasing knowledge, will have materially affected them in so short a period of time. In the longer period of fifteen years, even in the absence of statistical instruction, some changes would doubtless have taken place in medical opinions as to the causes of death; but as these changes will not affect the diseases most easy of diagnosis, such as typhus fever, the eruptive fevers,

diarrhœa, &c., the tables will still be found in many parts, throughout the whole period embraced in them, to furnish the materials of a just comparison.

In carrying out that comparison of year with year, which I have stated to be my second object, I propose to comment upon the several tables which form the Appendix, in the order in which they are placed, beginning with the births, deaths, and marriages, and ending with the more considerable of the special causes of disease. In this running commentary I propose, as I have just stated, to direct attention more particularly to the *fluctuations* in the mortality from special causes. It is necessary, therefore, that I should here point out the measure of fluctuation which I am about to employ. That which seems best adapted to the purpose is the quotient obtained by dividing the sum of all the successive differences between year and year, whether in excess or defect, by the number of those differences, and then reducing that quotient to a per-centage proportion of the average of all the years. I propose to call this per-centage the *Measure of Fluctuation*.

As such verbal explanations as these are apt to be imperfectly understood without the aid of an example, I will illustrate my meaning by taking the births and deaths in the metropolis for the short period of five years, from 1840 to 1844 inclusive.

The numbers of births to a million persons living in the metropolis for the five years in question, were, 30,348, 30,618, 31,512, 31,357, and 31,716, yielding an average of 31,110. The four successive differences between these numbers are 270, 894, 155, and 359; and the average difference 419·5. A calculation based upon these two averages (the average number and the average difference,) yields a per centage of 1·35, which per-centage is the *Measure of Fluctuation*.

Again, the numbers of deaths occurring in a million persons in the metropolis during the same period of five years were, 25,187, 24,179, 23,682, 24,929, and 24,860, yielding an average of 24,567; and four successive differences of 1.008, 497, 1,247, and 69, of which the average is 705·25. The per-centage, or *Measure of Fluctuation*, is, therefore, 2·87.

In this period of five years, therefore, the deaths fluctuated as 2·87, the births as 1·34, the one amount being more than twice as great as the other. In other words, the causes, whatever they may be, which, by their combined operation from year to year, brought about the ascertained number of births, were nearly twice as uniform in their operation as those causes, whatever they may be, which issued the ascertained number of deaths.

I shall have occasion also to make use of the greatest and least numbers in each series of facts; reducing the difference between them, or, in other words, *the Extreme Fluctuation*, to a per-centage proportion of the maximum numbers.

Having thus given some account of the tables which form the Appendix to this communication, and of the meaning of the columns headed "Mean Fluctuation," and "Extreme Fluctuation," I proceed to pass the several tables briefly under review, making such comments upon them as the figures they comprise seem most naturally to suggest.

TABLE I.—*Births, Deaths, and Marriages.*

The births, which amount, on an average of the fifteen years, to 32,028 in the million, have fluctuated between a minimum of 30,348 and a maximum of 33,736, the first number having been registered in the first year, the last number in the last year, of the series. The mean fluctuation in the intervening period has amounted to nearly 2 per cent.

The deaths, it will be observed, have been subject to much greater fluctuation. They have ranged from a minimum of 20,925 to a maximum of 30,078, the average being 24,864. The mean fluctuation is represented by the figures 9·51; or little short of 10 per cent. It will be observed, too, that the highest and lowest numbers, instead of occurring, as in the case of the births, in the first and last years of the series, occur in the two consecutive years 1849 and 1850.

The marriages, for the shorter period of thirteen years, present an amount of fluctuation intermediate between that of the births and of the deaths. The average number of marriages is 10,136; the extremes are 9,408 and 10,966. The mean fluctuation is 3·75, and the extreme fluctuation 14·20.

It will be seen that the extreme fluctuations in the numbers of births, deaths, and marriages, follow the same order as the mean fluctuations. Thus the mean and extreme fluctuations in the births were, respectively, 1·95 and 10·04: in the marriages 3·75 and 14·20; in the deaths 9·51 and 30·38.

The births, as it will appear from the last line of the table, are uniformly in excess of the deaths, and even the fatal year 1849 forms no exception to this rule. The excess varies from 1838 in that year to 11,086 in the year following.

TABLE II.—*Births and Deaths, Males and Females.*

In distinguishing the births and deaths as male and female, we have occasion to observe that both the mean and extreme fluctuations in births and deaths are somewhat greater in females than in males. As the differences, however, are not very considerable, it will suffice to have pointed out the fact.

TABLE III.—*Deaths at the Three Ages* 0–15, 15–60, *and* 60 *and upwards.*

There is in this table a difference worth observing both in the years in which the greatest and least numbers of deaths occur, and in the mean and extreme fluctuations. The years of the maxima and minima do not coincide for the three ages; nor are the rates of fluctuation the same. Between the ages of 15 and 60 the years of the greatest and least number of deaths are the same as for the total mortality at all ages. They are the years 1849 and 1850. The minimum number between the ages of 0 and 15 also occurs in the year 1850; but this is the only coincidence. The greatest mean and extreme fluctuation occurs in the period from 15 to 60; the least mean fluctuation from 0 to 15 and the least extreme fluctuation from 60 years of age upwards. The occurrence of the least mean fluctuation in persons under 15 years of age was, perhaps, scarcely to be expected.

TABLE IV.—*Deaths in Five Districts.*

This table, too, presents some results worthy of notice. In the first place it will be observed that in the East Districts alone do the maxima and minima coincide with the maxima and minima of the total deaths. In the South Districts the maximum number falls in the same year, 1849, but the minimum number in the year previous, instead of in the year following. In the West and Central Districts, again, the minima coincide with the minimum of total deaths; while the West and North Districts are distinguished by the occurrence of the greatest number of deaths in the last year of the series, 1854.

But the columns which embody the average number of deaths, and the mean and extreme fluctuations, present results still more striking. The mortality of the Southern Districts of the metropolis is shown to be greatly in excess of the mortality of all the other districts, while the rate of fluctuation, whether measured by the mean or extreme values, is proportionably still greater. The figures are sufficiently curious to deserve to be inserted in this place. The mean numbers of deaths per million inhabitants for the five districts are as follows:—

West Districts	....	3,676 deaths.
Central ,,	....	4,402 ,,
North ,,	....	4,670 ,,
East ,,	....	5,435 ,,
South ,,	....	6,535 ,,

The fluctuation, whether measured by mean or extreme results, does not exactly coincide with these figures; nor is the order of the districts the same. This will appear from the following tabular comparison:—

	Mean Fluctuation.	Extreme Fluctuation.
North Districts	5·67	18·58
West ,, ...	8·49	31·97
Central ,, ...	9·45	28·65
East ,, ...	9·56	31·66
South ,, ...	21·50	48·20

It will be observed that of these five groups of districts two (the East and the South) occupy the same relative position in both tables. But if the extreme fluctuation had been made the basis of the arrangement of the second table, the West Districts would have taken the place of the East, and the South Districts alone would have retained their place at the bottom of both tables. Everything, therefore, combines to proclaim the extreme unhealthiness of the districts on the south of the Thames. When contrasted with the most healthy group of districts (the West) their mortality is as 6,535 to 3,676; and when compared with the districts subject to least fluctuation (the North,) their mean fluctuation is as 21·50 to 5·67, and their extreme fluctuation as 48·20 to 18·58. It is remarkable that in this character of fluctuation the North and the South should be found occupying the two extremes. The only cause which seems capable of explaining a difference so

remarkable and so considerable is the prevalence of epidemics on the south side of the Thames, and the comparative immunity which the inhabitants of the higher districts on the north side enjoy from these scourges of the human race. The figures contained in the two tables now under consideration furnish a new inducement, if any were required, to improve to the utmost the drainage and sewerage of the low-lying districts on the south side of the Thames. If such improvement should be found, after a term of years, to have had little effect on the rate of mortality, or the prevalence of epidemics, every discouragement ought to be thrown in the way of the extension of buildings in so low and unhealthy a locality.

TABLE V.—*Deaths from Special Causes.*

This table consists of three parts :—1. The deaths from all causes, and from specified causes; 2. The deaths from seventeen principal groups of causes; and, 3. The deaths from the special diseases comprised in the first eleven of these principal groups. As attention has already been drawn to the deaths from all causes, it only remains to consider the second and third divisions of the table.

The deaths from seventeen principal groups of causes present some salient points worthy of attention. The seventeen groups admit, in the first place, of being divided into two classes, the one characterised by a high, the other by a low, or moderate, mean fluctuation. At the head of the first class stands the group of zymotic diseases, followed in order by diseases of the skin, &c., sudden deaths, malformations, atrophy, and diseases of the respiratory organs; with a mean fluctuation varying from 31·24, in the case of zymotic diseases, down to 11·26, in the case of diseases of the respiratory organs. At the head of the second class stands age, followed in order by diseases of the joints, bones, rheumatism, &c.; diseases of the uterus, (including puerperal diseases, &c.); diseases of the heart, &c.; diseases of the kidneys; violence, privation, &c.; dropsy, cancer, and other diseases of uncertain seat; debility from premature birth, &c.: tubercular diseases; diseases of the digestive organs; and, lastly, those of the brain, nerves, &c. The mean fluctuation in the case of this second class varies from 10·71, in the case of death from old age, down to 3·50 in the case of diseases of the brain, nerves, &c. Of the whole seventeen groups the zymotic diseases are those which present the highest mean rate of fluctuation, and the diseases of the brain, nerves, &c., the lowest.

Now it is well worthy of remark that the group which comes next in order to zymotic diseases is one which obviously owes its place to the circumstance of its comprising one disease at least which has, of late years, become epidemic, and has thus obtained a right to be placed itself in the zymotic group, namely, carbuncle. This disease which, in the first seven years of the fifteen, caused a number of deaths, varying from 1 to 4, in the last seven years caused a number of deaths varying from 7 to 36. A similar increase has taken place under the heads of "Phlegmon," and "Disease of Skin, &c.," which heads complete the group now under consideration. If we set aside this group of diseases of the skin, as now properly belonging to the zymotic class, in respect of one of its constituents at least, we come

next in order to the group designated "Sudden," and numbered " 16." The mean rate of fluctuation in this group is 17·46. But it will be observed that in the first three years, 1840, 1841, and 1842, the number of cases recorded under this head is unusually large, and that the figures in subsequent years show a tendency to fall off year by year. Now this is just one of those groups, or classes, in which we should expect the instructions of the Registrar-General to work the greatest change. We see, accordingly, that coincident with the issue of the "Statistical Nosology" (in the year 1843), there was a sudden fall from the maximum 455 down to 343, followed by a progressive diminution; and that the large numbers of the first three years were never again attained. But though there is reason to believe that this group has undergone considerable changes from the causes now assigned, it is still open to very large fluctuations, as will appear when it is stated that the mean fluctuation for the last seven years amounts to no less than 17·88, being somewhat in excess of the mean fluctuation for the whole fifteen years. Some cause unconnected with defects in registration must, therefore, be in existence to account for the fluctuations to which this group is subject. The considerable number of sudden deaths recorded in the fatal years, 1847, 1849, and 1854, renders it probable that a part, at least, of this fluctuation is due to epidemic influences.

Next in order, when measured by the amount of fluctuation (15·84), is the group distinguished as "Malformations," in which we observe a considerable increase in the year 1843, with a further increase in 1845, which can only be reasonably explained on the supposition that it results from improved registration following the instructions of the Registrar-General.

The group headed "Atrophy" follows after that headed "Malformations," with a mean fluctuation of 14·68. It is worthy of remark that the smallest number of deaths assigned to this cause (171), took place in 1840, the first of the series of fifteen years, and the largest number (826), in the last year of the series, 1854. So considerable a difference is almost sufficient of itself to show that this, too, is a group in which a great change in the mode of registration has taken place.

The group of "Diseases of the Respiratory Organs" does not call for any special comment. Considering that it comprises diseases which are strikingly affected by atmospheric changes, and especially by any considerable fall of temperature in the colder season of the year, the group presents a moderate amount of fluctuation, both mean and extreme. The mean fluctuation is 11·26, the extreme fluctuation 31·15.

Of the six groups constituting the first of the two classes into which the seventeen groups have been arbitrarily divided, one headed "Diseases of the Skin, &c.," has been shown to belong properly to the Zymotic group, and the remainder, with the exception of the last (" Diseases of the Respiratory Organs,") to owe much of their high rate of fluctuation, in all probability, to improvements in registration. It is obvious, therefore, that there is no cause of fluctuation that can compete with those changes in the constitution of the atmosphere which give rise to the diseases commonly designated as infectious, contagious, and epidemic, or grouped under the still more compre-

hensive title of "Zymotic Diseases." Between the figures (31·24) which represent the mean fluctuation of this class of maladies, and those (17·46) which represent the mean fluctuation of the group headed "Sudden," the difference is very considerable; and a still more remarkable difference prevails between the first-named group and the several members of the second class into which the whole seventeen groups have been arbitrarily divided. The mean fluctuation in this second class ranges from 10·71 down to 3·50; numbers which present a very striking contrast to the high rate of fluctuation of the Zymotic group.

In the group headed "Age," which presents a mean fluctuation of 10·71, there is that gradual falling off in the numbers registered which would seem to correspond to a very probable transference of registered deaths from a comparatively indefinite heading to other headings characterized by greater precision.

The very different and much more definite group headed " Diseases of Joints, Bones, viz., Rheumatism, &c.," shows very nearly the same mean and extreme fluctuation as this last group; and will serve as a caution against drawing very positive inferences from mere numerical results.

The next group ("Diseases of Uterus, viz., Puerperal Diseases, &c.,") presents no peculiarities worthy of notice.

The group of " Diseases of the Heart, &c.," shows an increase in 1843, with a progressive increase up to the maximum in 1847, which would seem to justify its being classed with those on which the instructions of the Registrar-General have produced a decided effect. There is every reason to suppose that many deaths registered in the early years of this series of fifteen years as " Dropsy," have, for many years past, been entered under the more fitting heading of " Diseases of the Heart."

The same observation applies with nearly equal force and justice to the group next in order, namely, " Diseases of the Kidneys." The progressive increase in the numbers registered under this head corresponds with the great improvement which has taken place of late years in the discrimination of this class of diseases. This group also has, doubtless, been reinforced from the less definite class of "Dropsy."

The group headed "Violence, Privation, &c.," is only so far worthy of note as that the amount of fluctuation (6·89) appears to be very small when it is considered how largely the human will operates to bring about the fatal results registered under these titles.

The mixed group designated "Dropsy, Cancer, and others of uncertain seat," presents, as will be seen, a low mean fluctuation with a considerable extreme fluctuation. The group headed "Debility from Premature Birth, &c.," has a still lower mean fluctuation, and a moderate extreme fluctuation.

"Tubercular Diseases," and "Diseases of the Digestive Organs," are equally remarkable for a low mean fluctuation (4·25 in each case), and a small extreme fluctuation (28·02 and 26·92).

"Diseases of the Brain, Nerves, &c.," stand at the bottom of this class, as showing the least amount of fluctuation, whether measured by mean or extreme results. Between this steady class and the highly fluctuating group of "Zymotic Diseases," the contrast is certainly

very striking. During the last seven years this group of "Diseases of the Brain, Nerves, &c.," shows a mean fluctuation of only 3·04.

I now propose to consider, very briefly, the third division of Table V., or that which shows the number of deaths year by year from individual diseases, together with the fluctuations, mean and extreme, to which they are subject.

The first and largest division in this part of the table consists of the diseases now known as Zymotic diseases, but formerly as the class of endemic, epidemic, and contagious diseases. The group of Zymotic Diseases, which at present comprises eighteen separate maladies, but which admits of still further extension, by being made to embrace at least, Quinsey, from Group 7, and Carbuncle, from Group 11, has been already pointed out as being characterized beyond all the principal groups of diseases by the very considerable fluctuation, mean and extreme, to which it is subject.

As the principal diseases belonging to this class are remarkable for the readiness with which they may be distinguished, even by non-professional persons, they are not likely to have been affected by improvements in registration or in medical science. The whole fifteen years, therefore, are equally available for comparison; and as these diseases are of great importance in their relation to the public health, I shall begin by arranging the more considerable of them in the order of their fluctuation, beginning with that which exhibits the greatest mean fluctuation, and then proceed to offer such remarks as the figures suggest.

Table showing the Mean and Extreme Fluctuation of the Zymotic Class of Diseases.

	Maximum.	Minimum.	Mean.	Mean Fluctuation.	Extreme Fluctuation.
1. Cholera.....................	6,209	15	780	153·97	99·76
2. Influenza	562	35	110	95·45	93·77
3. Small Pox................	890	87	399	69·92	90·22
4. Scarlitina	2,132	354	899	59·51	83·40
5. Measles....................	1,122	249	575	41·74	69·92
6. Dysentery................	163	38	85	34·12	76·68
7. Carbuncle*	36	1	9	33·33	97·22
8. Hooping Cough	1,217	582	857	31·04	52·17
9. Diarrhœa	1,522	246	747	29·45	83·83
10. Typhus	1,600	615	951	23·55	61·56
11. Purpura (Scurvy)....	36	6	17	23·53	83·33
12. Erysipelas	260	113	164	17·68	56·54
13. Quinsey†	53	22	34	17·65	58·49
14. Thrush	170	63	103	10·68	62·94
15. Croup	229	130	167	8·98	43·23
16. Ague......................	15	5	10	·23	66·66
17. Remittent Fever	52	9	30	·22	82·70
18. Infantile Fever........	26	9	17	·20	65·38
19. Syphilis	76	11	43	·15	85·52
20. Hydrophobia	3	1	0·73	38·35	66·66

* From Group 11.   † From Group 7.

There are three diseases in this list which scarcely admit of being considered separately, inasmuch as the mortality set down to two out

of three of them is evidently swollen by cases really due to the remaining one. These diseases are diarrhœa, dysentery, and cholera. That cases of cholera are entered under the heads of Diarrhœa and Dysentery, may be inferred from the fact that the greatest number of cases of both these diseases entered in any one year is set down for the year 1849, in which the Asiatic cholera was at its maximum; and that a similar excess of cases of diarrhœa occurs in the year 1854, when cholera was also rife. It is only in consequence of the close resemblance of the common English cholera to the Asiatic cholera that entries under the single head of " Cholera" are made year by year. Two diseases·have thus come to be considered as one. The subjoined table shows the number of cases entered each year under these three heads, together with the aggregate numbers, and the fluctuations to which they are subject singly and collectively. The table is divided into two parts, consisting each of seven years, (with an intermediate year, 1847). In the first septennial period we had no visitation of epidemic cholera, while in the second period we suffered from two such visitations. By comparing the two periods we shall know what excess of mortality is due, in the second period of seven years, to two visitations of Asiatic cholera.

	1840.	1841.	1842.	1843.	1844.	1845.	1846.	Average of the 7 Years.	Mean Fluctuation.	Extreme Fluctuation.	1847.
Cholera	33	15	62	44	32	21	108	45	71·11	86·11	52
Diarrhœa....	246	248	369	428	348	407	1,022	438	35·62	75·93	886
Dysentery..	38	42	79	139	62	48	74	69	52·17	72·66	138
Total....	317	305	510	611	442	476	1,204	552	37·68	74·66	1,076

	1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 7 Years.	Mean Fluctuation.	Extreme Fluctuation.
Cholera	292	6,209	55	90	67	351	4,269	1,619	168·12	99·11
Diarrhœa....	857	1,522	812	960	897	921	1,290	1,037	• 31·82	46·65
Dysentery..	150	163	78	72	63	65	70	94	21·28	61·35
Total ...	1,299	7,894	945	1,122	1,027	1,337	5,629	2,750	111·09	88‘02

It will be seen, by comparing these tables, that the total mortality in a million of persons living in the metropolis from English cholera, diarrhœa, and dysentery, in the first seven years (1840 to 1846 inclusive,) in which there was no visitation of Asiatic cholera, was 3,865, or an average of 552 per annum; while in the last seven years (1848 to 1854 inclusive,) the total mortality was 19,253, or an average of 2,750. The excess of mortality, which may be presumed to have been due to Asiatic cholera in the last seven years was, therefore, 19,253 — 3,865, or 15,388; and the annual excess 2,750 — 552, or 2,198. The excess now spoken of must be understood to consist of the additional deaths for the three diseases, cholera, diarrhœa, and

dysentery, and not of the addition made by the visitations of Asiatic cholera to the mortality from all causes.

The deaths from cholera, diarrhœa, and dysentery combined, in the first seven years, will be found to have reached their maximum in the year 1846, the hottest year of the fourteen, and with one exception (1841) the year of the greatest rain-fall. This was also the second year of the potato failure, and food was dear.

The relation existing between a high mortality from these diseases and a high temperature is very apparent, and will be distinctly perceived in the following tabular comparison, in which the mortality and the annual average temperature are placed side by side, beginning with the lowest mortality and the lowest mean temperature respectively.

Years.	Deaths from Cholera, Diarrhœa, and Dysentery.	Mean Annual Temperature.	Years.
1841	305	47·6	1845
1840	317	47·7	1840
1844	442	48·6	1844
1845	476	48·7	1841
1842	510	49·4	1843
1843	611	49·6	1842
1846	1,204	51·3	1846

There are here three coincidences in relative position between mortality and temperature; and the year of highest mortality is the year of the highest annual temperature. No other atmospheric condition which can be expressed in figures bears any similar relation to the mortality from these causes.

If we assume the yearly average of 552 deaths from cholera, diarrhœa, and dysentery, during the seven years from 1840 to 1846 inclusive, to be the true average from these three analogous diseases, and consider them as one disease, we shall be in a condition to point out the order of importance of the several maladies comprised in this group of Zymotic diseases. The disease which commits the greatest ravages among the population of the metropolis is typhus fever. The deaths set down to this cause amount to 951 in the million inhabitants. Scarlatina comes next in order, as the cause of 899 deaths. Hooping-cough occupies the third place, and gives rise to 857 deaths. Measles proves fatal to 575 persons; cholera, diarrhœa, and dysentery collectively, to 552 persons; small pox, to 399; croup, to 167; erysipelas, to 164; influenza, to 110; thrush, to 103; syphilis, to 43; quinsey, to 34; remittent fever, to 30; infantile fever and purpura, each to 17; ague, to 10; carbuncle to 9; and hydrophobia, to less than 1, in the year.

The facts relating to the mean and extreme fluctuation of diseases belonging to the Zymotic class are extremely curious. The diseases which give rise to the greatest mortality, and especially those that belong to the class of contagious or infectious maladies, are all to be found occupying a high place in the table. Cholera, as it is natural to expect, occupies the first place, for its visits have been few, and the mortality caused by it considerable. Influenza comes next in

order, then small pox. But the fluctuation of small pox is materially increased by legislation. Scarlatina follows small pox, and measles scarlatina. At the other end of the scale, and contrasting in a remarkable manner with the diseases just mentioned, are three diseases (ague, remittent fever, and infantile fever,) which are neither infectious nor contagious, and one malady (syphilis), which stands at the bottom of the scale, with a mean fluctuation of less than one-sixth per cent., and stands alone as having taken its rise in causes over which the patient can exercise complete control. It is certainly well worthy of remark that a disease, so directly resulting from an act of volition, should issue in a mortality varying so little from one year to another, though presenting a range of mortality (from 11 to 76,) little inferior to that of several diseases characterized by a very considerable mean fluctuation. The small mean fluctuation of syphilis is the more remarkable, as the number of facts on which the calculation is founded is inconsiderable.

The group of diseases marked 2 in Table V., and comprising dropsy, cancer, and several diseases of uncertain seat, is characterized by a moderate mean fluctuation, the smallest fluctuation being in the case of cancer.

The group which follows next in order (Tubercular Diseases) is also subject to a moderate mean fluctuation; and it comprises one very important disease, namely, pulmonary consumption, which shows a remarkable degree of steadiness, whether we test it by the mean or by the extreme fluctuation. This fatal malady of the young adult proved fatal, in the fifteen years comprised in the table, to a maximum of 3,941, a minimum of 2,645, and an average of 3,230, in the million, being little less than a seventh part of the total deaths at all ages, and more than a third part of the deaths from 15 to 60. The average number of deaths from this fatal disease is, as nearly as possible, 13 per cent. of all the specified causes of death at all ages, and 39 per cent. of the deaths from 15 to 60 years of age.

The diseases of the fourth group, or those of the Brain, Nerves, &c., vary considerably in their rate of fluctuation; Inflammation of the Brain, Apoplexy, and Palsy, and the less defined group of Diseases of the Brain, presenting a very moderate rate of fluctuation. On the other hand, the very considerable class of "Convulsions" presents a very high rate of fluctuation.

The fifth and sixth groups, consisting of Diseases of the Heart and of the Lungs, are characterized by a moderate rate of fluctuation, ranging from a minimum of 8·13 to a maximum of 22·12.

The diseases of the seventh group, or those of the Digestive Organs, with the single exception of the small class of Diseases of the Spleen, also present a very moderate rate of fluctuation, the minimum being 8·86, and the maximum 23·53.

The remaining groups do not demand special notice. The columns of fluctuation contain no figures calculated to arrest the attention.

The object with which this communication was taken in hand is sufficiently answered by the publication of the five tables in the Appendix, which, it is believed, will be found very useful for purposes of reference; and by the running commentary which constitutes the text. I may yet take an opportunity of turning to other account the figures contained in the tables which form the Appendix.

APPENDIX.

TABLE I.

Births and Deaths (in 1,000,000 Inhabitants) in 365 days.

Years	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
Marriages	9,994	9,888	9,518	9,733	10,058	10,685	10,727	9,671	9,408	9,716	10,490	10,913	10,966	...	...	10,136	3·75	14·20
Births	30,348	30,618	31,512	31,357	31,716	31,864	33,155	30,621	31,920	31,916	32,011	32,894	33,340	33,431	33,736	32,028	1·95	10·04
Deaths	25,187	24,179	23,682	24,929	24,860	23,375	23,290	27,085	25,812	30,078	20,925	23,382	22,467	24,393	29,351	24,864	9·51	30·38
Excess of Births over Deaths	5,161	6,439	7,830	6,428	6,856	8,489	9,865	3,536	6,108	1,838	11,086	9,512	10,883	9,038	4,385	7,164	...	...

TABLE II.

Births and Deaths—Males and Females (in 1,000,000 Inhabitants) in 365 days.

Years		1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
Births.	Males	15,461	15,643	16,188	15,997	16,244	16,262	16,756	15,566	16,276	16,325	16,283	16,849	16,999	17,133	17,101	16,338	2·05	9·75
Births.	Females	14,885	14,974	15,324	15,358	15,471	15,601	16,398	15,055	15,643	15,590	15,727	16,044	16,339	16,296	16,633	15,689	2·10	10·52
Deaths.	Males	12,980	12,279	11,949	12,862	12,636	11,848	11,833	13,599	13,187	14,948	10,531	11,863	11,638	12,561	14,810	12,629	9·26	29·55
Deaths.	Females	12,206	11,901	11,734	12,119	12,175	11,528	11,457	13,487	12,683	15,110	10,393	11,514	10,920	11,833	14,547	12,240	9·88	31·22

TABLE III.

Deaths at Three Ages (in 100,000 Inhabitants) in 365 days.

	Years	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
Ages.	0—15	11,758	11,053	11,125	11,938	11,928	10,947	10,570	11,882	12,710	13,256	9,205	10,864	10,218	11,285	13,755	11,499	9·65	33·07
	15—60	8,354	8,098	7,760	7,891	8,009	7,660	7,935	8,949	8,334	11,021	7,049	7,603	7,367	7,922	9,990	8,263	11·38	36·04
	60 and upwards	5,034	4,948	4,756	5,004	4,875	4,742	4,759	6,236	4,659	5,701	4,562	4,795	4,348	4,995	5,391	4,987	10 84	30·28

TABLE IV.

Deaths in Five Districts (in 1,000,000 Inhabitants) in 365 days.

	Years	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
Districts.	West	3,774	3,524	3,571	3,701	3,740	3,548	3,416	3,827	3,708	4,123	3,114	3,517	3,435	3,562	4,579	3,676	8·49	31·97
	North	4,677	4,410	4,473	4,639	4,594	4,183	4,378	5,135	4,760	4,855	4,948	4,587	4,420	4,954	5,137	4,670	5·67	18·58
	Central	4,957	4,984	4,642	4,900	4,177	4,430	4,165	4,911	4,388	4,764	3,556	4,002	3,863	4,018	4,285	4,402	9·45	28·65
	East	5,476	5,342	5,203	5,624	5,401	5,146	5,046	6,024	5,887	6,516	4,467	4,989	4,743	5,455	6,153	5,435	9·56	31·66
	South	6,302	5,919	5,794	6,065	6,554	6,070	6,283	7,200	5,073	9,781	5,726	6,286	5,112	6,647	9,204	6,535	21·50	48·20

TABLE

Deaths in Seventeen Classes (in 1,000,000

CAUSES OF DEATH.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847
ALL CAUSES	25,206	24,197	23,699	24,947	24,878	23,392	23,306	27,105
SPECIFIED CAUSES	24,946	23,964	23,463	24,735	24,773	23,306	23,220	27,044
Diseases:								
1. Zymotic Diseases	4,575	4,226	4,046	5,160	5,520	4,636	4,549	6,285
2. Dropsy, Cancer, and others of uncertain seat	1,791	1,649	1,612	1,499	1,415	1,243	1,017	1,072
3. Tubercular Diseases	5,113	5,038	4,858	4,881	4,680	4,465	4,643	4,462
4. Of Brain, Nerves, &c.	3,328	3,110	3,016	3,041	3,134	2,918	2,936	2,961
5. Of Heart, &c.	543	530	548	634	786	832	846	952
6. Of Respiratory Organs	3,491	3,511	3,441	3,604	3,661	3,683	3,441	4,998
7. Of Digestive Organs	1,742	1,693	1,640	1,695	1,530	1,547	1,629	1,604
8. Of Kidneys	134	125	169	163	185	232	257	284
9. Of Uterus; viz. Puerperal Dis., &c.	257	272	233	271	252	284	317	336
10. Of Joints, Bones; viz. Rheumatism, &c.	171	134	146	168	164	166	236	247
11. Of Skin, &c.	13	10	20	16	11	26	41	43
12. Malformations	25	19	23	43	43	63	91	87
13. Debility from Premature Birth, &c.	602	595	601	530	502	474	548	564
14. Atrophy	171	194	239	264	322	360	564	628
15. Age	1,884	1,803	1,753	1,816	1,601	1,435	1,064	1,405
16. Sudden	400	406	455	343	292	257	200	302
17. Violence, Privation, &c.	706	649	663	607	675	685	841	814
1. Small-pox	673	563	188	225	890	440	122	428
Measles	617	520	677	741	583	1,122	355	797
Scarlatina	1,064	354	641	959	1,494	525	441	643
Hooping Cough	582	1,217	839	980	637	879	966	718
Croup	204	209	229	200	203	170	132	132
Thrush	170	139	129	141	128	119	118	93
Diarrhœa	246	248	369	428	348	407	1,022	886
Dysentery	38	42	79	139	62	48	74	138
Cholera	33	15	62	44	32	21	108	52
Influenza	38	118	41	53	66	35	55	562
Purpura, Scurvy	9	6	8	7	10	12	13	36
Ague	5	8	10	11	14	8	9	15
Remittent Fever	16	9	9	12	16	15	34	43
Infantile Fever	12	12	9	13	13	15	26	22
Typhus	687	615	615	1,070	887	630	853	1,428
Erysipelas	169	134	123	113	158	149	165	235
Syphilis	11	15	16	23	28	40	56	57
Hydrophobia	1	2	2	1	1	1	...	...
2. Hæmorrhage	93	94	94	85	91	74	80	96
Dropsy	1,137	1,030	1,026	913	822	650	358	430
Abscess	117	90	71	55	51	31	31	37
Ulcer	13	13	13	11	13	14	25	36
Fistula	9	7	6	13	5	8	12	6
Mortification	146	129	94	115	99	91	84	87
Cancer	254	253	270	281	308	352	402	353
Gout	22	33	38	26	26	23	25	27
3. Scrofula	58	56	57	72	79	86	146	125
Tabes Mesenterica	135	139	149	231	228	287	409	444
Phthisis	3,941	3,914	3,740	3,649	3,503	3,258	3,271	3,144
Hydrocephalus	979	929	912	929	870	834	817	749

V.

Inhabitants,) in 365 days.

1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
25,831	30,080	20,940	23,399	22,474	24,411	29,380	24,883	9·51	30·38
25,716	29,945	20,790	23,235	22,304	24,140	29,105	24,712	9·55	30·57
7,938	12,302	4,135	5,234	4,904	5,315	10,541	5,957	31·24	67·11
1,026	1,029	985	996	986	1,040	1,038	1,226	5·22	45 00
4,155	3,949	3,680	4,152	4,068	4,191	4,071	4,427	4·25	28·02
2,720	2,743	2,573	2,564	2,487	2,662	2,687	2,858	3·50	25·27
760	848	847	918	894	936	909	785	8·02	44·33
3,615	3,625	3,371	3,936	3,497	4,319	4,011	3,747	11·26	31·15
1,438	1,379	1,273	1,350	1,340	1,335	1,365	1,504	4·25	26·92
275	257	263	255	274	296	297	231	7·80	57·91
346	319	288	263	274	234	258	280	9·30	32·66
186	200	205	198	216	199	203	189	10·60	45·75
39	33	37	37	54	50	70	33	23·34	85·71
96	75	76	68	82	75	80	63	15·84	80·21
511	552	568	657	652	643	689	579	5·01	31·20
573	590	494	556	554	720	826	470	14·68	79·30
969	985	930	987	956	969	911	1,298	10·71	51·64
264	314	291	218	179	198	260	292	17·46	60·66
805	745	774	846	887	958	889	769	6·89	36·64
725	228	215	451	483	87	269	399	69·92	90·22
512	507	421	559	249	402	558	575	41·74	69·92
2,132	943	507	536	1,057	825	1,371	899	59·51	83·40
730	1,031	678	913	649	1,058	985	857	31·04	52·17
130	142	132	133	142	149	195	167	8·98	43·23
94	78	63	69	65	66	72	103	10·68	62·94
857	1,522	812	960	897	921	1,290	747	29·45	83·83
150	163	78	72	63	65	70	85	34·12	76·68
292	6,209	55	90	67	351	4,269	780	153·97	99·76
295	56	47	150	49	45	41	110	95·45	93·77
28	24	19	22	23	22	22	17	23·53	83·33
15	12	8	8	7	10	10	10	·23	66·66
43	35	38	52	38	41	49	30	·22	82·70
20	16	19	25	19	21	18	17	·20	65·38
1,600	1,090	829	992	897	1,057	1,064	951	23·55	61·56
260	202	161	147	141	129	179	164	17·68	56·54
55	44	53	55	58	66	76	43	·15	85·52
...	...	...	...	...	...	3	0·73	38·35	66·66
79	90	94	76	97	84	77	87	11·61	22·92
363	380	336	346	336	337	356	588	12·41	70·45
44	40	38	38	41	51	49	52	16·39	73·50
25	25	23	20	21	22	28	20	18·08	69·44
8	7	8	10	6	12	10	8	41·37	61·54
96	81	78	96	72	81	85	95	13·68	50·70
392	382	383	385	388	432	407	349	6·60	41·20
19	24	25	25	25	21	26	25	16·17	50·00
165	156	131	161	185	177	178	122	14·75	69·75
384	370	324	343	347	384	438	307	12·70	69·55
2,939	2,777	2,645	2,970	2,875	2,992	2,833	3,230	4·45	32·88
667	646	580	678	661	638	622	767	6 ·00	40·75

TABLE V.—

Deaths in Seventeen Classes (in 1,000,000

CAUSES OF DEATH.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.
4. Cephalitis	335	329	311	306	314	287	291	275
Apoplexy	477	463	426	475	564	548	607	587
Paralysis	452	401	406	437	442	429	478	507
Delirium Tremens	46	44	40	49	47	55	73	70
Chorea	2	3	2	1	6	4	1	2
Epilepsy	120	97	99	99	109	124	149	168
Tetanus	14	11	8	9	14	10	9	6
Insanity	29	23	24	24	36	33	44	50
Convulsions	1,625	1,484	1,452	1,387	1,350	1,159	990	1,013
Disease of Brain, &c.	228	255	248	254	252	269	294	283
5. Pericarditis	20	16	17	28	57	46	39	49
Aneurism	27	19	13	19	20	30	26	32
Disease of Heart, &c.	496	495	518	587	709	756	781	871
6. Laryngitis	14	14	10	23	25	38	57	93
Bronchitis	271	355	355	415	578	816	1,154	1,948
Pleurisy	47	50	39	46	47	61	69	110
Pneumonia	2,057	1,960	2,054	2,169	2,005	1,886	1,496	1,924
Asthma	728	722	581	552	585	532	381	605
Disease of Lungs	374	410	402	399	421	350	284	318
7. Teething	524	488	478	490	358	348	230	254
Quinsey	40	38	33	49	53	26	26	39
Gastritis }	532	511	521	449	{ 30	30	47	45
Enteritis }					{ 374	313	260	239
Peritonitis	35	32	34	39	56	76	101	121
Ascites	23	17	16	31	44	42	50	48
Ulceration of Intestines }	38	40	41	54	34	63	74	58
Hernia	49	55	49	47	51	46	69	80
Ileus	37	69	65	53	67	55	68	70
Intussusception	14	7	4	12	12	17	21	26
Stricture of Intestines }	15	14	11	11	10	14	18	14
Disease of Stomach, &c. }	137	96	101	139	137	144	179	163
Disease of Pancreas	1	1	...	...	1	1	2	1
Hepatitis	32	32	27	37	40	64	104	96
Jaundice	52	59	55	61	64	57	68	62
Disease of Liver	211	233	200	219	197	247	304	287
Disease of Spleen	2	1	5	4	2	4	8	1
8. Nephritis	12	14	10	13	11	12	13	11
Ischuria	7	4	3	3	1	...	3	6
Diabetes	8	10	10	9	11	21	11	15
Stone	14	9	10	6	13	18	15	19
Cystitis	8	6	10	7	7	8	11	12
Stricture of Urethra	9	8	21	23	29	27	25	25
Disease of Kidneys, &c. }	76	74	105	102	113	146	179	196
9. Paramenia	5	5	6	8	2	8	8	8
Ovarian Dropsy	6	10	7	13	12	14	24	21
Childbirth	188	184	168	192	173	195	212	228
Disease of Uterus, &c.	58	73	52	58	65	67	73	79
10. Arthritis	2	1	...	3	1	5	4	6
Rheumatism	75	64	62	64	65	69	128	120
Disease of Joints, &c.	94	69	84	101	98	92	104	121
11. Carbuncle	1	1	3	3	2	4	1	7
Phlegmon	4	3	2	1	2	5	15	14
Disease of Skin, &c.	8	6	15	12	7	17	25	22
Causes not specified	260	233	236	212	105	86	86	61

Continued.

Inhabitants,) in 365 days.

1848.	1849.	1850.	1851.	1852.	1853.	1854.	Average of the 15 Years.	Mean Fluctuation.	Extreme Fluctuation.
232	242	226	227	219	229	253	280	5·00	34·63
555	549	572	528	482	534	527	524	7·06	29·82
474	487	497	449	423	483	509	458	6·11	21·22
63	72	67	55	51	58	65	57	12·16	45·21
3	1	6	4	4	4	5	3	54·54	83·33
134	150	123	137	153	165	150	132	12·12	41 07
6	11	8	9	10	4	7	9	31·11	71·43
42	39	41	47	47	53	46	38	13·16	56·60
931	906	760	856	841	871	855	1,098	60·92	53·23
280	286	273	252	257	261	270	264	4·16	22·45
54	53	53	58	48	37	52	42	20·40	72·41
31	37	38	34	29	41	35	29	18·73	68·30
675	758	756	826	817	858	822	715	8·13	43·17
84	84	81	84	84	95	131	61	17·45	92·37
1,358	1,425	1,415	1,687	1,552	2,083	1,814	1,148	22·12	87·00
79	66	56	80	64	67	62	63	20·63	64·54
1,568	1,579	1,340	1,557	1,356	1,571	1,585	1,740	10·92	38·22
297	289	313	345	260	332	264	452	19·47	64·28
229	182	166	183	181	171	155	282	10·99	63·18
207	243	215	253	234	268	292	325	12·48	60·50
39	36	31	31	23	22	28	34	17·65	58·49
43	38	42	44	33	30	33	} 316	8·86	69·74
209	179	160	153	163	131	129			
118	95	94	92	88	77	81	176	13·16	73·55
52	47	48	56	52	62	59	43	13·95	74·20
59	51	41	49	58	56	57	52	18·13	54·05
65	57	55	58	57	59	59	57	11·02	42·50
56	54	57	60	60	64	65	60	13·80	47·14
21	26	19	16	19	18	19	17	23·53	84·62
13	15	20	18	18	15	20	15	16·33	50·00
153	132	107	122	121	119	111	131	12·21	46·37
2	...	...	2	...	1	3	...	...	...
89	76	84	80	86	86	85	68	13·23	74·04
62	71	61	70	77	62	73	64	11·72	32·47
245	254	234	241	244	260	245	241	9·83	35·20
5	5	5	5	7	5	6	4	50·00	87·50
9	10	12	14	12	14	17	12	16·66	47·06
4	4	4	6	5	4	4	4	34·00	85·71
20	18	19	17	20	22	25	16	21·00	68·00
13	13	13	11	14	15	13	13	23·08	68·42
16	18	13	11	15	14	15	12	20·32	66·66
25	16	20	20	23	26	25	21	19·05	72·41
188	178	182	176	185	201	198	153	8·50	63·18
5	7	5	3	6	4	2	5	40·00	75·00
20	22	26	19	19	18	23	17	21·41	76·92
256	221	191	174	187	156	173	193	10 88	39·06
65	69	66	67	62	56	60	65	10 77	34·17
2	3	3	5	8	6	4	3	57·14	87·50
120	119	127	118	133	117	128	101	10·00	53·38
64	78	75	75	75	76	71	85	14·12	47·11
9	7	8	8	21	28	36	9	33·33	97·22
10	10	11	10	13	9	14	8	32·12	93·33
20	16	18	19	20	13	20	16	28·56	76·00
115	135	150	164	170	271	275	170	17·65	77·82